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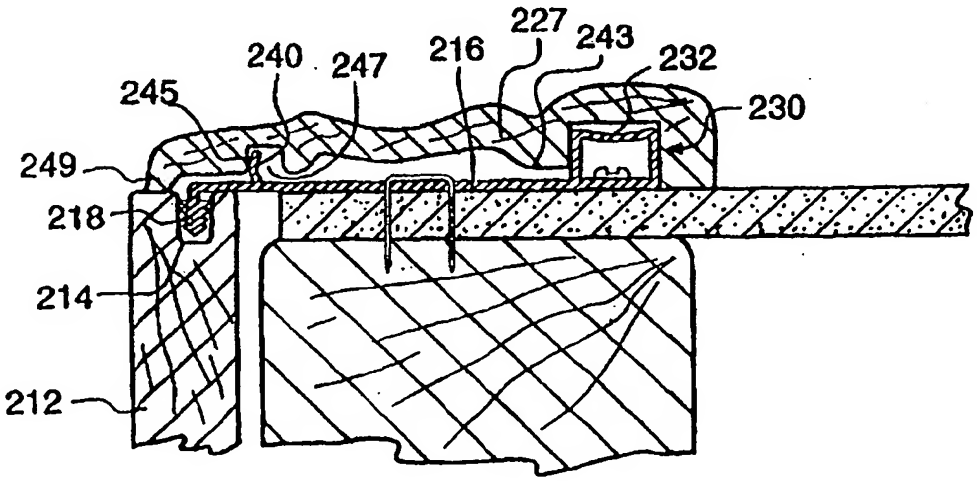

(57) Abstract

Wood trim (227) is attached to the wall around a door, window, etc. by means of an extruded plastic attachment strip (216). The strip is formed with a hollow box-shaped protrusion which serves as a spline (230), which engages a complementary groove in the profile of the wood trim (227). A bar (218) formed in the back of the strip (216) profile serves to hold the strips in complementary slots (214) in the door jamb (212).

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Title: TRIM ATTACHMENT SYSTEM

This invention relates to wood trim, of the kind used to trim the edges of door frames and window frames, wainscotting, and also baseboards and skirting boards, crown mouldings, etc, in houses and other buildings.

The invention is a development of the technology disclosed in PCT/GB-93/00583, published 30 Sept 1993 as WO-93/19273.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

By way of further explanation of the invention, exemplary embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Fig 1 is a cross-section of a spline-strip, for use in the invention;
Fig 2 shows the strip of Fig 1 in an installation;
Fig 3 shows a mitred corner between two lengths of trim;
Fig 4 shows a mitred corner between two spline strips;
Fig 5 shows trim to which draft-excluding seals have been added;
Fig 6 is a cross-section of a baseboard installation;
Fig 7 is a pictorial view of a kit of components for a trim system;
Fig 8 is a cross-section of another spline-strip;
Fig 9 is a cross-section of another spline-strip;
Fig 10 is a cross-section of another spline-strip;

The apparatuses shown in the accompanying drawings and described below are examples which embody the invention. It should be noted that the scope of the invention is defined by the accompanying claims, and not necessarily by specific features of exemplary embodiments.

Fig 1 shows a trim attachment strip 150, which is formed as a plastic extrusion. Fig 2 shows the strip of Fig 1 in use to attach a piece of wood trim to a wall, associated with a door opening.

The profile of the strip 150 includes a base or web 152, which lies flat against the wall. (The web may be bowed slightly, in profile, so that when the strip is nailed flat to the wall the edges of the profile are pressed against the wall.) Protruding outwards from the web 152 is a spline 154. The spline 154 has the form of a hollow rectangular box, comprising left and right side walls 156 and a roof 158.

The roof 158 is slightly dished or curved, as shown. At the outer corners of the junction between walls and the roof, the profile includes a small, radiused promontory 160. By virtue of the promontories 160, the spline 154 is slightly thicker at its outer end, or roof end.

Protruding inwards (with respect to the wall) from the back of the spline-strip 150 is a protrusion or bar 163. This protrusion is ridged, as shown in Fig 1.

Protruding outwards from the front of the spline-strip 150 is an inclined rib 165. The rib 165 protrudes not at right angles, but at the slight angular inclination as shown in Fig 1.

Fig 2 shows the spline-strip 150 installed. The ridged protrusion 163 engages a groove 167 cut in and along the length of the edge of the (wood) door-jamb-piece 169. By this engagement, the spline-strip 150 and the jamb-piece 169 are locked together against relative lateral movement.

As shown in Fig 2, the door-jamb-piece 169 is secured in place relative to the door opening by virtue of the fact that the spline-strip 150 is secured to the wall stud 170 by means of screws 172. (Nails, staples, etc, may be used to secure the spline-strip.) The exact position and orientation of the jamb-piece 169 in the opening can be adjusted by adjusting the exact place in which the spline-strip is fixed to the stud.

The jamb-piece as illustrated in Fig 2 is located at the door-hinge-side of the opening, and it will be understood that the corresponding jamb-piece at the door-open-side of the opening is secured in a similar manner. Also, the jamb-piece of the lintel of the opening is secured in similar manner.

The spline-strip 150, arranged and used as described, provides for a very simple installation of the door-jamb-pieces and the lengths of trim around the door, even though the installer may not be a skilled craftsman. The arrangement as described enables the installation to be done in a manner that make it easy to ensure that the mitred corners of the finishing wood trim will be exactly square and even.

Usually, a door opening is not exactly square and even. The installer may temporarily secure the lintel jamb-piece and spline-strip, and then, with the aid of a set square or jig, align the hinge-side and the open side-jamb pieces and spline-strips. He may install both the inside-the-room and the outside-the-room strips at the same time. Generally, the installer will find that he can easily set the lintel piece first, and then can set the two side pieces exactly at right angles to the lintel piece.

In Fig 2, it will be noted that no shims are required between jamb-piece and stud in order to hold the jamb-pieces in their correct location in the opening. The jamb-pieces are fully located and constrained by the spline-strips, and by the screws 172. The space 174 is made large enough to accommodate such out of squareness and other unevenness as may be required, to ensure that the jamb-pieces and the spline-strips can be put in place exactly at right angles to each other.

The jamb-pieces 169, spline-strips 150, and the lengths of trim 176, may be pre-made in-factory. The purchaser states the size of the door, and is supplied with the appropriately-sized kit; all the items in the kit are pre-cut to size and all mitres are pre-cut on accurate factory machinery. A kit may be made up of pre-cut and pre-mitred spline-strips; also, pre-cut and pre-mitred lengths of trim (which are not only pre-cut and pre-mitred, but are also fully and finally finished); and also, fully and finally finished jamb-pieces. Since doors come in a limited number of standard sizes, it is economical for wood trim shops to hold stocks of the pre-cut trim, spline-strip, and jamb-pieces in kits for the various standard sizes of door.

The pre-made trim kits provide even the amateur carpenter with a simple way of ensuring that all mitres are not only cut perfectly, but are installed at an accurate right angle. This is in addition to the other benefits of the system: (a) the fact that no nails etc are used to secure the trim means that the trim may be made with a factory-applied finish; and (b) the trim is removable and can be removed and replaced to simplify the task of wall-papering, painting, etc.

In some cases, the installer might wish to remove a sliver of material from the edge of a jamb-piece 169, for example to make the edge lie flush with the wall surface. The grooves 167 should be made deep enough to allow for some material to be removed from the jamb-piece, and still leave the groove deep enough that the ridged protrusion 163 does not bottom in the groove.

The profile of the wood trim 176 may be provided with a space to receive electrical wires running inside the trim. Such wires may be held in place with special clips, which hook into holes drilled in the web of the spline-strip. Alternatively, wires can be secured simply by passing a staple around the wire and through the with web.

The trim 176 is provided with a spline-groove 178 and a rib-groove 180. To install the trim to the spline-strip 150, the length of trim is first assembled over the leaning rib 165; the rib 165 bends slightly when the trim is pressed down over the spline 154, resulting in a (slightly) heavier contact force between the rib 165 and the trim 176, and a force which tends to draw the edge of the trim into a slightly tighter contact with the jamb-piece.

The spline-groove 178 and the spline 154 have a slight interference fit, especially over the roof-end of the spline, where, as mentioned, the spline is slightly thicker because of the corner promontories 160. The roof 158 is able to bend (in a buckling mode), to the extent required for the spline 154 to fit in the groove 178 with a good contact force.

The hollow-box form of the spline 154 profile is excellent in providing just the right balance between stiffness and resilience in the spline.

It may be noted that if the spline were solid, only a very limited degree of interference between the spline and the spline-groove could then be allowed -- typically about 0.01 mm

maximum. The designer dare not provide more interference than that, or the spline-groove 178 in the trim may tend to crack open.

The solid-spline system as described in earlier publications is able to provide excellent retaining and holding power of the trim to the spline, even though the spline has only a light interference, hardly any interference, or no interference at all, with the spline-groove. However, when the spline is made of plastic, in the form of an extrusion in PVC, for example, the coefficient of friction between the PVC of the spline and the wood of the spline-groove can be low enough that the designer wishes to resort to interference to provide the holding power needed.

Heavy interference could not be contemplated when the spline was solid. A solid spline has too little resilience, and if the interference is just slightly too much, the wood trim will crack. On the other hand, if the "spline" were to take the form of two protruding arms, side by side, and cantilevered out from the web, the resilience of such cantilevered arms would then be too much: it would not in that case be possible to develop enough contact force between such arms and the sides of the spline-groove to give enough holding power.

It may be regarded that in the hollow-box profile of the spline the roof 158 serves to hold the outer ends of the left and right walls 156 apart. The roof 158 is resilient enough, in the bending/ buckling mode, to allow the walls to bend inwards slightly, if the groove should be cut narrow, and yet enough interference is provided to ensure good holding power if the groove should be cut on the wide end of its permitted tolerance range. This just-right degree or rate of resilience of the spline is enhanced if the roof 158 is given the nominal curvature, as shown.

The thickness of the roof can be adjusted, also, to provide just the right degree of resilience: it has been found that making the roof slightly thinner than the walls can help give the right balance between a too-hard spline, which has no "give" and splits the wood trim if the groove is slightly too tight, and a too-soft spline, in which the spline does not provide enough grip to the sides of the groove. The hollow-box design of spline enables the spline to grip the trim tightly enough for good securement, over a tolerated range of groove widths.

The degree of resilience attributable to the hollow-box profile of the (plastic) spline may be expected to provide holding power over a tolerance range of the order of 0.02 mm.

The hollow-box profile allows a greater dimensional magnitude of interference between spline and spline-groove than was the case with the solid spline. In the context of plastic splines:- on the one hand, a solid plastic spline has hardly enough resilience to permit any interference; on the other hand, two cantilevered arms would have too much resilience. But two cantilevered arms joined by a roof (which is what the hollow-box profile amounts to) has just the right degree of resilience to provide a good holding force without demanding difficult-to-manufacture tolerances. Interference-fits generally require tight tolerances: the hollow-box

profile for the plastic spline eases that requirement enough that a factory-cut groove in a length of solid oak or other wood trim can be accurate enough.

A problem that can sometimes arise with mitred corners is that the wall is not quite flat in the plane of the wall. As a result, at a mitred corner, the horizontal lintel trim might protrude perhaps a half-millimetre further out from the wall than the vertical trim. Even though the mitre might be exactly a right angle, such protrusion-mismatch can be quite noticeable.

Fig 3 shows how the lengths of trim may be joined together at the mitred corners, in a way that eliminates protrusion-mismatch. The mitred edge 183 of the vertical length of trim 185, and the corresponding mitred edge of the horizontal length of trim 186, are provided with slots 187, into which is inserted a biscuit 189. The biscuit 189, conventionally, is a piece of hardwood or plastic sheet formed to the oval shape as shown. The biscuits may be glued in place, or, if the trim profile is of appropriate thickness, the biscuits may be screwed in place, as at 190. Of course, the screws are screwed in from the back of the trim, and must be short enough not to extend right through the trim.

In Fig 3, the trim lengths 185,186 are secured together before being placed on the wall. This means that the installer must be able to rely on the accuracy of the mitres, as cut, in both the trim lengths and the spline-strips. It will be understood that securing the trim-lengths together with biscuits, and then placing the secured-together trim-lengths on the spline-strips, poses a very demanding requirement for accuracy of the mitres and of the dimensions of the pieces. However, such accuracy is available if the mitred joints between the trim lengths and the spline strips are factory-made to suit the particular door size. The pre-grooved door-jamb-pieces 169 should be included also in the same kit.

It is recognised that the in-factory-accuracy of making the mitred joints in this way is not wasted nor compromised, even if the door opening is (as they usually are) not truly accurate and square.

It is convenient to join the lintel trim-length to the two vertical trim-lengths, by means of the biscuit connectors, just before the sub-assembly comprising the three trim-lengths is applied to the already-installed spline-strips. The sub-assembly of the three trim-lengths is awkward, and vulnerable to transit damage; however, a professional trim installer may be willing to take the trouble to handle the vulnerable assembly with the needed care, in exchange for the benefits of pre-making and pre-gluing the biscuit connectors in-factory.

Pre-making the sub-assembly of the trim-lengths by pre-gluing biscuit connectors into the joints is much more efficacious in the case of window trim. With window trim, there are four lengths of trim, in the form of an enclosed rectangle. A window trim sub-assembly, being an enclosed rectangle, is much more robust than a door trim sub-assembly, and can be expected to survive handling by amateur craftsmen. However, it will be appreciated that the need for accurate cutting of the lengths and of the mitre angles is very pressing when the trim

is installed as a sub-assembly onto the already-installed spline-strips; such pre-making of the sub-assembly is only possible when the pieces are supplied together, in a kit, having been made on accurate machinery.

In fact, if there is protrusion-mismatch of the trim-lengths at a mitred joint because the wall surface is not quite flat, the two spline-strips making up the joint also may be expected to have the mismatch. Indeed, in some cases, if the mismatch of the spline-strips is eliminated, there will be no need to cater for mismatch in the trim itself. Certainly, the installation and attachment of the trim lengths (and the possible detachment of the trim-lengths at some future time) is much more convenient if the trim-lengths are not permanently glued together as a pre-made sub-assembly.

Catering for possible protrusion-mismatch between mitred spline-strips is very simple, in view of the hollow-box profile of the spline-strip. As shown in Fig 4, injection-moulded plastic corner-pieces 192, having a rectangular form which fits the hollow interior of the spline 154, are inserted into the splines at the mitred corners. When the spline-strips 150 are screwed or nailed to the wall, the corner-pieces 192 constrain and hold the two spline-strips at the same protrusion level, even if the wall should be (slightly) uneven.

The corner-pieces 192 may serve in this way equally for door trim as for window trim.

More than one spline or rib may be provided on the strip, having also a hollow interior, and corresponding corner pieces may be provided for that also.

A preferred way of installing the trim and its mounting system may be described as follows. The lengths of trim, the spline-strips, and the door-jamb-pieces, are all, pre-mitred, and pre-finished, in-factory, and are purchased by the installer as a kit for a particular width of door, or door opening. The kit is opened in the room, and the door-jamb-pieces are assembled, on edge, on the floor. The spline-strips for the inside of the room are assembled to the door-jamb pieces; the ribbed protrusions 163 are entered into the groove 167 while the jamb-pieces are still laid on the floor.

The door-jamb pieces may now be secured together at the mitred corners, using appropriate fasteners. (Of course, these fasteners should be so arranged as not to be visible after installation.)

The assembly comprising the fixed-at-the-corners jamb-pieces and the inside-the-room spline-strips, which are already assembled to the jamb-pieces, may now be lifted off the floor of the room, and the assembly placed in the door opening. The installer will generally be able to tell, by eye, by looking at the mitred corners, both of the jamb-pieces and of the spline-strips, whether the corners are accurately at right angles. It may be regarded that if the installer cannot see any out-of-squareness at the corner by looking at the line of the mitre, then the out-of-squareness is so small it can be ignored. Set squares and other instruments are

generally not required. The installer must be able to "trust" the mitres for squareness, but this is acceptable with factory-made mitres.

The spline-strips are secured to the wall when the installer is satisfied, looking at the lines of the mitres, that the corners are square. The door jamb-pieces are secured by securing the spline-strips to the wall. Once the inside-the-room spline-strips are secured, the outside-the-room spline-strips may be installed, using the grooves 167 cut in the far edges of the jamb-pieces. The outside-the-room spline strips are secured to the wall also.

The jamb-pieces and the spline-strips having been installed with accurately-square corners, in this manner, the lengths of wood trim may now be assembled to the splines. The installer may be confident that the mitred corners of the wood trim will look square (and indeed will be square), provided the installer took a little trouble to ensure the mitred corners of the spline-strips looked square, by looking at the mitre-line.

When installing the spline-strips and the wood trim in a case of renovation, rather than original installation, it will generally be impractical for the jamb-pieces to be provided with grooves 167. For renovation work, therefore, the spline-strip is provided without the protrusion 163. Also, for window trim, the protrusions 163 will not be present.

Even though, for renovation, there is no protrusion-in-groove engagement between the jamb-pieces and the spline-strips, out-of-squareness of the door jamb can be accommodated (within limits) simply by the placement of the spline-strips. For renovation, the installer relies on looking at the line of the mitre to indicate when the spline-strips are square; he does not rely on the alignment of the strips with the existing door (or window) jamb. The installer looks at the line of the mitre (a distance of about 8.5 cm if the spline-strips are 6 cm wide) and makes sure the mitre line appears to be the same thickness all along its length. With only a minimal skill, the installer can fix the spline-trim with its corners square enough that the corners in the finished wood trim, when the wood trim comes to be pressed onto the splines, appear to be perfectly aligned.

Fig 5 shows a useful variation to the trim, in which further grooves 196 are provided in the cut-profile of the trim. Rubber sealing strips 198 are carried in the grooves 196, and serve to prevent drafts which may be emanating from inside the (hollow) wall and from the space 174, from leaking around the trim.

Fig 6 shows another manner in which the invention may be applied: for wide trim, such as may be required for a baseboard, the trim may be provided in, for example, three sections. The outer two sections 200,201 are attached by means of the spline attachment system of the invention, whereas the middle section 203 is screwed in place. Normally, the screws holding the middle section remain concealed by the outer two sections. When decorating the room, the outer two sections, being spline-held, can be removed. A similar arrangement may be employed also for crown moulding trim.

Fig 7 shows a kit of components, as may be used for securing trim around a door, when the application is of such a kind that the door jamb can be made specially to suit the trim system. It can be arranged, in that case, in particular, that the door jamb pieces 210,212 may be provided with slots or grooves 214 along their edges (similar to Fig 2). The spline-strips 216 are provided with integral barbed or ridged bars 218, which engage the groove.

Bearing in mind that the spline-strips 216 are present on both sides of the door, such a fixing system is extraordinarily strong, even though the bars 218 are simply pressed into the grooves 214. The door jamb pieces 210,212 need not in fact be screwed to the door frame at all, themselves, but can be held in place entirely by means of the spline-strips 216. (The spline strips of course are nailed or stapled, through the plasterboard, to the door frame in the wall.) The carpenter may attach the door hinges, latch, etc, to the jamb pieces with full confidence that even if the door were to be slammed hard the jamb is rigidly secured. Also, the jamb-pieces may be pre-finished, in-factory, since no through-fasteners (which might damage the finish) are required to hold them in place.

In some installations, the width of the wall is not quite the same as the width of the jamb-piece 210,212, or the wall may be slightly bowed. Mis-match due to thickness variations or lack of straightness can easily be accommodated (within limits, of course) by the spline-strips 216, which are fairly flexible in the plane of the wall, and yet still the jamb-pieces are held very firmly in place relative to the wall, by virtue of the securement of the spline strips to the wall.

The bars 218, being barbed, remain firmly secured to the jamb-pieces, once assembled therein. The force on the groove 214 is considerable, but the jamb-piece (much more so than the trim) is thick and chunky, and is not prone to cracking due to the heavy forces. Although the wood trim can be removed from the spline-strips by hand manipulation, the barbed bars 218 are a barely-removable fit in the grooves 214.

The kit of components of Fig 7 includes corner pieces 220 of the spline-strip. To form these corner pieces, two pieces of the plastic spline-strip extrusion are cut off at (exactly) 45 degrees. The two pieces are welded together at (again exactly) 45 degrees. These manufacturing processes can be carried out in-factory, where the required degree of accuracy is easy to obtain.

To assemble the kit of components, first the corner-pieces 220 are pressed into the horizontal and vertical jamb-pieces 210,212. This is done on both sides of the wall, ie inside and outside the room. (The wood trim is absent at this time.) Next, the corner-pieces are attached to the wall, by screwing, stapling, etc. With the corner-pieces of the spline-strip secured to the jamb-pieces, it is ensured that the intersections of the jamb-pieces are accurately at right angles, simply by fixing the corner-pieces of the spline-strip to the wall while the corner-pieces are assembled to the jamb-pieces. Both the inside and outside corner-pieces are secured at this time.

Next, the horizontal and vertical fill-in pieces 223,225 of the spline-strip are cut to length, their barbed bars 218 pressed into the grooves 214 in the jamb-pieces. The fill-in pieces are fixed to the wall, again both inside and out. No particular care and skill is needed to align the fill-in pieces of spline-strip with the jamb-pieces. Each is constrained by the other to adopt the correct position, without the need for measurements, or marking out, etc, by the carpenter.

The jamb-pieces 210,212 are secured to the spline-strips 216 over their whole lengths, which is why the securement of the jamb-pieces is so firm and rigid. In other installations, when door shims are used for example, jamb-pieces are secured at only perhaps two or three points along their lengths.

Finally, the trim 227 (Fig 8) is pounded on. In the kit, the horizontal piece of trim is pre-cut, in the factory, to match the nominal door size; that is to say, to match exactly the width of the horizontal jamb-piece 210. The vertical pieces of trim may be arranged to be cut to the correct height by the carpenter, the mitred corners of the vertical of trim being done in the factory.

The fixing of the spline-strip 216 is done by inserting screws into the spline 230 itself – the spline being hollow, the screws go through clearance holes in the roof 232 of the spline, and abut the floor 234 of the spline. Staples (or screws, or nails, or other suitable fasteners) may be inserted through the main flat area 236 of the spline-strip, into the wall.

The use of the pre-made corner-pieces 220 makes it substantially less demanding to arrange that the of trim, when assembled, fit exactly together. The arms of the corner 220 are long enough to ensure the pieces of trim are forced to be correctly aligned to the corner-pieces.

In Fig 8, the spline 230 itself has the bowed and slightly thinned roof 232, as previously described. The side walls 238 of the hollow spline are plain, and may be straight (parallel) or may have a slight draft angle.

In Fig 8, the rib 240 is curved. The curved rib 240 interacts with the profile 243 of the trim piece in such a way that the rib presses forcefully against the side 245 of a groove 247 cut in the trim. The friction arising from this forceful contact holds the inner end 249 of the trim tight against the wall. (If only the main spline 230 were provided, i.e if the rib 240 were not present, the inner end 249 of the trim might tend to lift.)

In the case of the installation of wood trim to pre-existing buildings, the following points may be noted. Although the grooves in the jamb-pieces can be readily provided in new installations, it is, in general, not possible to provide grooves in the jamb pieces if the jamb pieces are already in existence in the building.

Thus, for home-improvement installations, there are no grooves on the jambs, and no barbed

ribs or bars on the profile of the spline-strip 216' (Fig 9). Still, the pre-made corners may be used with advantage.

First, the carpenter cuts the horizontal trim-piece with mitred ends, suitably to fit the door size. (Or, lumber stores may stock already-mitred-both-ends pieces of trim to suit standard door widths.) The carpenter assembles the two corner pieces to the horizontal trim piece, and presents those components in place on the wall, and marks the wall. He removes the corner pieces from the trim, and then nails the corner-pieces to the wall, in the positions as marked. A horizontal fill-in piece of spline-strip may be cut slightly shorter than the space left between the corners-pieces, and this fill-in piece now in turn is pressed into the horizontal trim; the trim is then assembled lightly to the already fixed corner, and marks are made on the wall for the line of the fill-in piece. The trim is removed, and the fill-in piece nailed to the marks on the wall.

The carpenter can place the vertical of spline-strip similarly accurately. With all the spline-strips all in place, finally the trim can be pounded on.

For home-improvement installations, more care is needed for marking and placement of the spline-strips than when the spline-strips were located in the grooves in the jamb-pieces. But still, the amount of care and attention with marking and placement, needed to make the trim appear neat (and especially for the mitred corners to fit accurately) is much less than with many conventional installation systems.

In the version of the profile shown in Fig 10, the rib 240' is arranged to face the other way, i.e to touch the other side of the groove of the trim. Now, the pressure between the rib 240' and the side of the groove 247 drives the profile of the plastic spline-strip into tension and the profile of the wood trim into compression, an arrangement that may be preferred in some cases.

It is emphasised that the above-described trim fixing systems are particularly suitable when the trim is of solid wood of the kind used for decorative trims, e.g oak. It is a demanding task to secure solid wood trim, because the wood has a tendency to split at the corners of grooves. Therefore, the splines cannot be too tight a fit in the grooves: as explained, it is only when the splines and the grooves engage each other over their whole lengths that a nominally loose fit is found to be tight enough to hold the trim in place.

It may be noted that extruded plastic can change dimensions by as much as 2-3% with changes in humidity and temperature. Obviously, the householder does not want the trim to fall off in the winter, and by engineering the fit to obtain over the width of a relatively thin (e.g 1 cm) spline, such percentage dimensional changes have insignificant effect on the fit. If the fit were between two surfaces that were, say, 5 cm apart, instead of 1 cm apart, the change of dimensions might easily lead to trim fall-off problems.

The problem of the trim being liable to split is not confined to solid wood trim: increasingly, thick trims are being manufactured by wrapping a sheet of veneer over consolidated sawdust, or over cheap softwood, or other composites, and these can tend to split even more than solid wood. It may be noted that thin trims, even in solid wood, being flexible, can actually be less likely to split. Plastic trim, i.e solid plastic, does not tend to split, so it is easy to arrange that plastic trim is held in place very firmly by engagement with a backing strip. But thick, solid wood trim (or veneered sawdust trim) is still considered far more attractive than plastic – provided it can be held in place.

When fitting trim around a window, four mitred corners have to be aligned, and means may be provided for permitting all four corners to be made truly square. First, the upper horizontal spline-strip is secured in place, and then the two vertical spline-strips are secured, one at each end. It is a simple matter to make these two corners square, because the trim pieces may be used as templates for marking and fixing the spline-strips. Next, the lower horizontal spline-strip is put in place, but now the trim piece cannot be used as a template for squaring the final corner of the spline strip, because the trim masks the spline-strip. The spline-strips should be provided with slotted holes in the region of the final corner, via which the spline-strips may be secured temporarily, such securement being such that the spline-strips may be knocked finally into place by gradual reduction of any out-of-squareness mismatch.

In another arrangement of door trim, the welded-angle corner-assemblies (cf 220, Fig 7) may be arranged differently. The vertical arm of the assembly may be made as long as the door height, i.e 2 metres or thereabouts. The short arm may be approximately 20 cm long. As such, the corner assembly is a little more vulnerable to being damaged during handling and installation, but not much: the benefit is a considerable simplification of the task of fitting the trim around the door. Often, no horizontal fill-in piece (cf 223) is required. Of course, in that case, a left-side corner is different from a right-side corner, and both must be stocked and purchased.

Claims

CLAIM 1. Wood trim apparatus, which includes a trim-mounting spline-strip for attaching the wood trim to a wall, around doors and windows, baseboards, corner mouldings, or the like, wherein:
the spline-strip is of plastic, and is elongate, and comprises a unitary structure having the same cross-sectional profile at all points along its length;
the cross-sectional profile includes a base or web, which is adapted for direct application to a flat surface of a wall;
the cross-sectional profile includes a spline which, when the spline-strip is applied to a wall, protrudes from the wall;
the spline includes left and right side wall components, and a roof component;
and the components of the spline are arranged to form a hollow box-shaped enclosure.

CLAIM 2. Apparatus of claim 1, wherein the roof of the hollow spline is slightly curved or dished inwards.

CLAIM 3. Apparatus of claim 2, wherein the outer walls of the hollow spline are provided with small, radiused, promontories.

CLAIM 4. Apparatus of claim 2, wherein the spline-strip includes a protruding rib, which, when the spline-strip is applied to a wall, protrudes from the wall;
the protruding rib is resilient in the direction defined by the plane of the cross-section and the plane of the wall.

CLAIM 5. Apparatus of claim 1, wherein the spline-strip includes a protruding bar, which, when the spline-strip is applied to a wall, protrudes inwards, into the plane of the wall.

CLAIM 6. Apparatus of claim 4, wherein the spline-strip includes a protruding bar, which, when the spline-strip is applied to a wall, protrudes inwards, into the plane of the wall, and wherein, in cross-sectional profile of the spline-strip, the hollow spline lies towards one end of the base or web, the bar lies towards the other end of the base or web, and the rib lies intermediate therebetween and closer to the bar than to the spline.

CLAIM 7. Apparatus of claim 1 wherein:
the wood trim is a unitary structure having the same cross-sectional profile along its length;
the cross-sectional profile of the trim includes a groove, and the groove is sized to be a light fit on the spline.

CLAIM 8. Apparatus of claim 7, wherein:
the spline strip includes a protruding rib, which, when the spline-strip is applied to a wall, protrudes from the wall;
the protruding rib is lightly and resiliently deformable in the direction defined by the plane of the cross-section and the plane of the wall;

the profile of the trim includes a face which is so arranged that, when the trim is assembled to the spline-strip, the face is resiliently engaged by the protruding rib in the said direction;
the arrangement of the rib and the face are such that the friction created by the engagement therebetween acts to resist the trim being dislodged from the spline-strip.

CLAIM 9. Appratus of claim 8, wherein the resilience of the rib and the orientation of the face are so disposed as to stress the profile of the trim in tension and the profile of the spline-strip in compression.

CLAIM 10. Apparatus of claim 8, wherein the resilience of the rib and the orientation of the face are so disposed as to stress the profile of the trim in comression and the profile of the spline-strip in tension.

CLAIM 11. Apparatus of claim 7, wherein the apparatus includes vertical-lying and horizontal-lying lengths of the said trim, and corresponding lengths of the spline-strips, the lengths being all pre-cut and pre-mitred, and accurately matched.

CLAIM 12. Apparatus of claim 11, wherein the vertical-lying and horizontal-lying lengths of trim are pre-formed into a sub-assembly of matching pieces.

CLAIM 13. Apparatus of claim 12, wherein the sub-assembly of horizontal-lying and vertical-lying lengths forms an enclosed rectangle, the combination being suitable for installation around a window.

CLAIM 14. Apparatus of claim 12, wherein the apparatus includes also corresponding door-jamb-pieces, all pre-cut and accurately matched;
the jamb-pieces are provided with grooves along the edges thereof;
and the spline-strips are provided with bars, located on the back of the web, which engage the grooves in the edges of the jamb-pieces.

CLAIM 15. Apparatus which includes two of the spline-strips as claimed in claim 1, and a corner piece;
the corner piece is profiled to fit snugly inside the hollow interiors of the splines of the spline-strips, and is so shaped that, when placed in the hollow interiors of the two spline-strips arranged in a 90-degree mitred corner, the corner-piece is effective to hold and constrain the spline-strips in the said mitred corner against relative movement.

CLAIM 16. Apparatus which comprises two of the spline-strips as claimed in claim 1, wherein the two spline-strips are welded together into a corner assembly, having the form of a 90-degree mitred corner.

CLAIM 17. Apparatus which comprises two of the said welded corner assemblies of the

spline-strip of claim 16, having short arms, the arms having square ends;
one horizontal-lying length of the spline-strip of claim 1, cut square both ends;
two vertical-lying lengths of the spline-strip of claim 1, cut square both ends;
one horizontal-lying length of trim, being trim of a unitary structure having the same cross-sectional profile along its length, wherein the cross-sectional profile of the trim includes a groove, and the groove is sized to be a light fit on the spline;
and two vertical-lying lengths of the said trim, each mitred one end.

CLAIM 18. Apparatus which comprises two of the kits as claimed in claim 17, being an inside kit and an outside kit, wherein:
the assembly includes a horizontal-lying and two vertical-lying door-jamb-pieces;
the jamb-pieces are provided with grooves along the edges thereof;
the spline-strips in the kits are provided with bars, located on the back of the web, which engage the grooves in the edges of the jamb-pieces;
the arrangement of the assembly is such that, upon application thereof to a doorframe in a wall, and upon securement of the splines to the wall, the door-jamb-pieces, in the absence of direct fixing of the door-jamb-pieces to the doorframe, are held rigidly with respect to the wall.

CLAIM 19. Appratus of claim 12, wherein the horizontal-lying and vertical-lying lengths of trim include means enagageable with both lengths at a mitred corner, the means being suitable for holding the lengths of trim together against relative movewment in the direction perpendicular relative to the wall.

CLAIM 20. Apparatus of claim 7, wherein the trim is provided with draft-excluding seals, arranged to contain drafts within the wall.

CLAIM 21. Assembly of claim 7, wherein the fit of the groove to the spline, after assembly, across the width of the groove, is between zero clearance and 1/4 mm clearance.

CLAIM 22. Assembly of claim 21, wherein one of either the groove or the spline is tapered, to the extent that the clearance between the groove and the spline, upon presentation of the groove to the spline just prior to assembly is about 1/2 mm.

CLAIM 23. Assembly of claim 7, wherein the groove is less than about 15 mm in width.

CLAIM 24. Assembly of claim 7, wherein the groove and the spline are plain-sided, in that the sides of the grooves and splines include no protrusions or beads or re-entrant aspects, and in that the fit of the trim to the spline is such that the wood of the trim is not, in substance, required to flex resiliently, upon engagement.

CLAIM 25. Assembly of claim 7, wherein the distance apart of the side surfaces of the spline is, in substance, not more than the distance apart of the side surfaces of the groove,

whereby the fit of the spline to the groove, when assembled, at a particular cross-sectional location thereof, is not an interference fit.

CLAIM 26. Assembly of claim 16, wherein the corner piece has arms of unequal length, the longer arm having a length of at least 1.5 metres, and the short arm having a length of no more than 40 cm.

CLAIM 27. Procedure for attaching solid wood door and window trim, baseboard trim, corner moulding, or the like, to a wall, wherein:
the procedure includes the step of providing lengths of solid wood trim, and lengths of spline;
the procedure includes the step of providing a groove in the trim which is complementary in cross-sectional size and shape to the cross-section of the spline;
the procedure includes the step of fixing the spline solidly to the wall by means of fasteners;
the procedure includes the step of applying the trim over the spline, whereby the groove in the trim engages the spline;
the spline is formed with a pair of opposed, outwardly-facing, side surfaces;
the groove is formed with a complementary pair of opposed, inwardly-facing, side surfaces;
the spline is formed with a top surface, being a surface of the spline which lies between the side surfaces, and which, when the spline is fixed to the wall, faces away from the wall;
the groove is formed with a bottom surface, being a surface of the groove which lies between the side surfaces of the groove,
the groove and spline are so dimensioned and arranged that, upon assembly of the groove to the spline, the side surfaces of the spline fit together, and lie in close operational gripping engagement with the side surfaces of the groove;
the groove and spline are so dimensioned and arranged that, upon assembly of the groove to the spline, the top surface of the spline and the bottom surface of the groove lie substantially clear of each other;
the form of the spline and of the groove in the trim are such that, when the spline is fixed to the wall, and the trim is assembled on the spline, the said opposed side surfaces of the groove and of the trim lie at a substantial angle with respect to the plane of the wall;
and the procedure includes the step of so dimensioning the groove and the spline that, upon engagement, the sides of the groove are in contact with the sides of the spline, thereby creating a frictional resistance to the dislodgement of the trim from the spline.

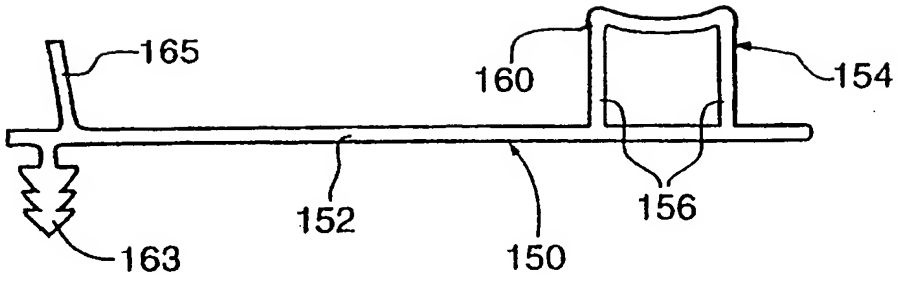

FIG. 1

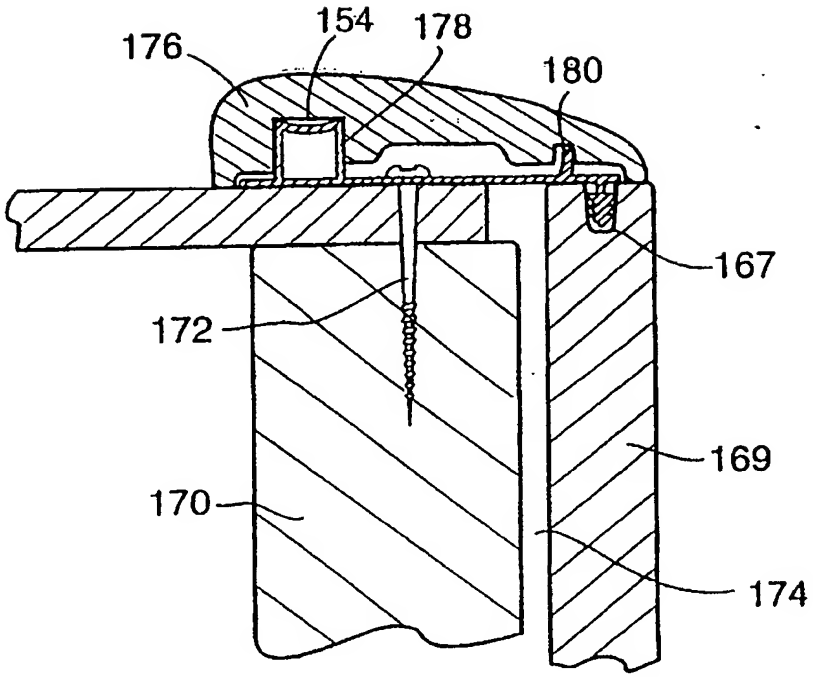

FIG. 2

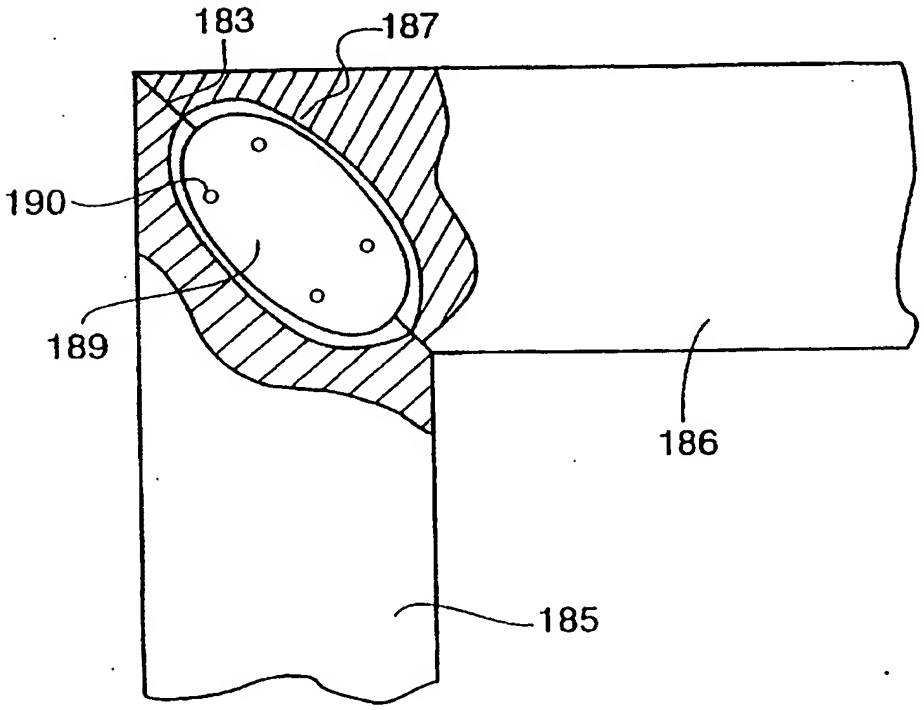

FIG. 3

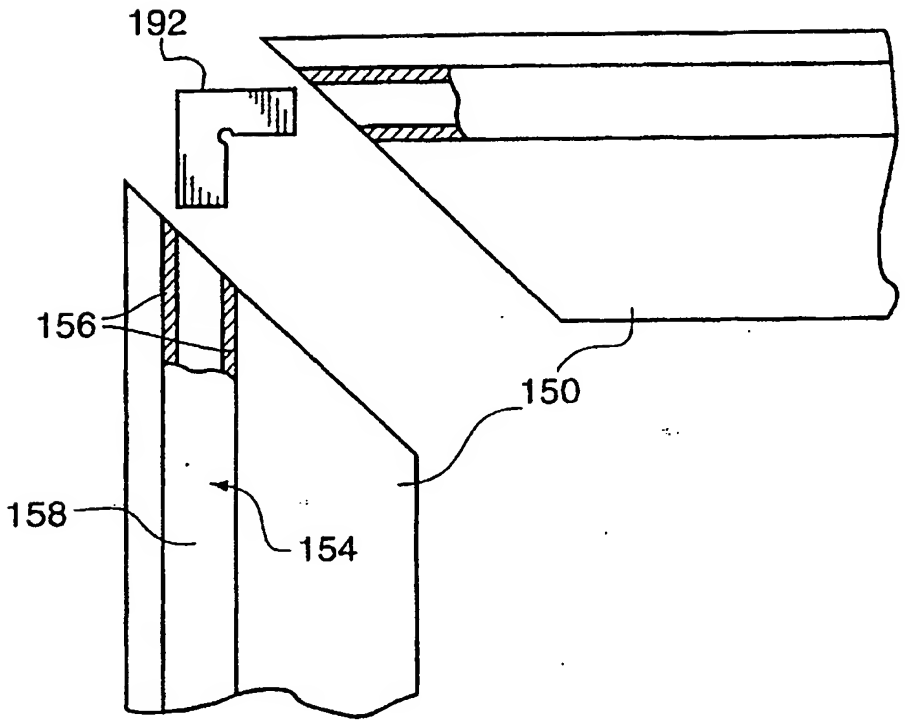

FIG. 4

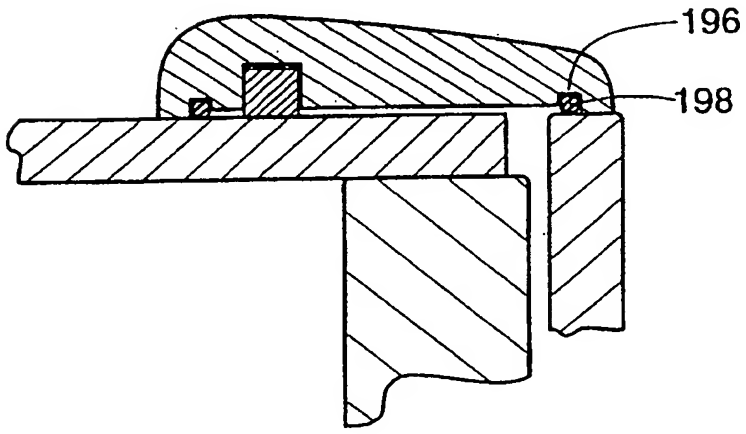

FIG. 5

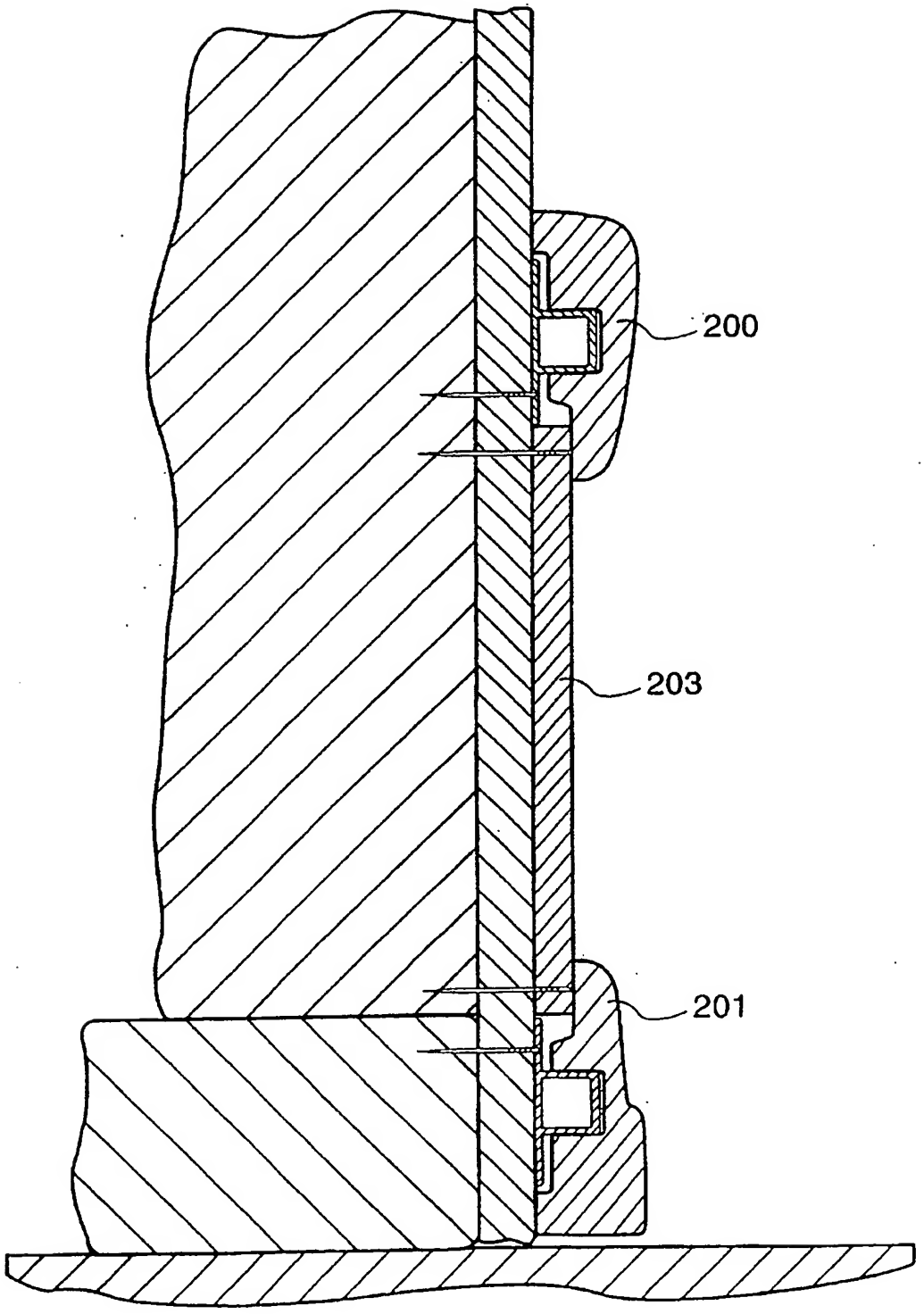

FIG. 6

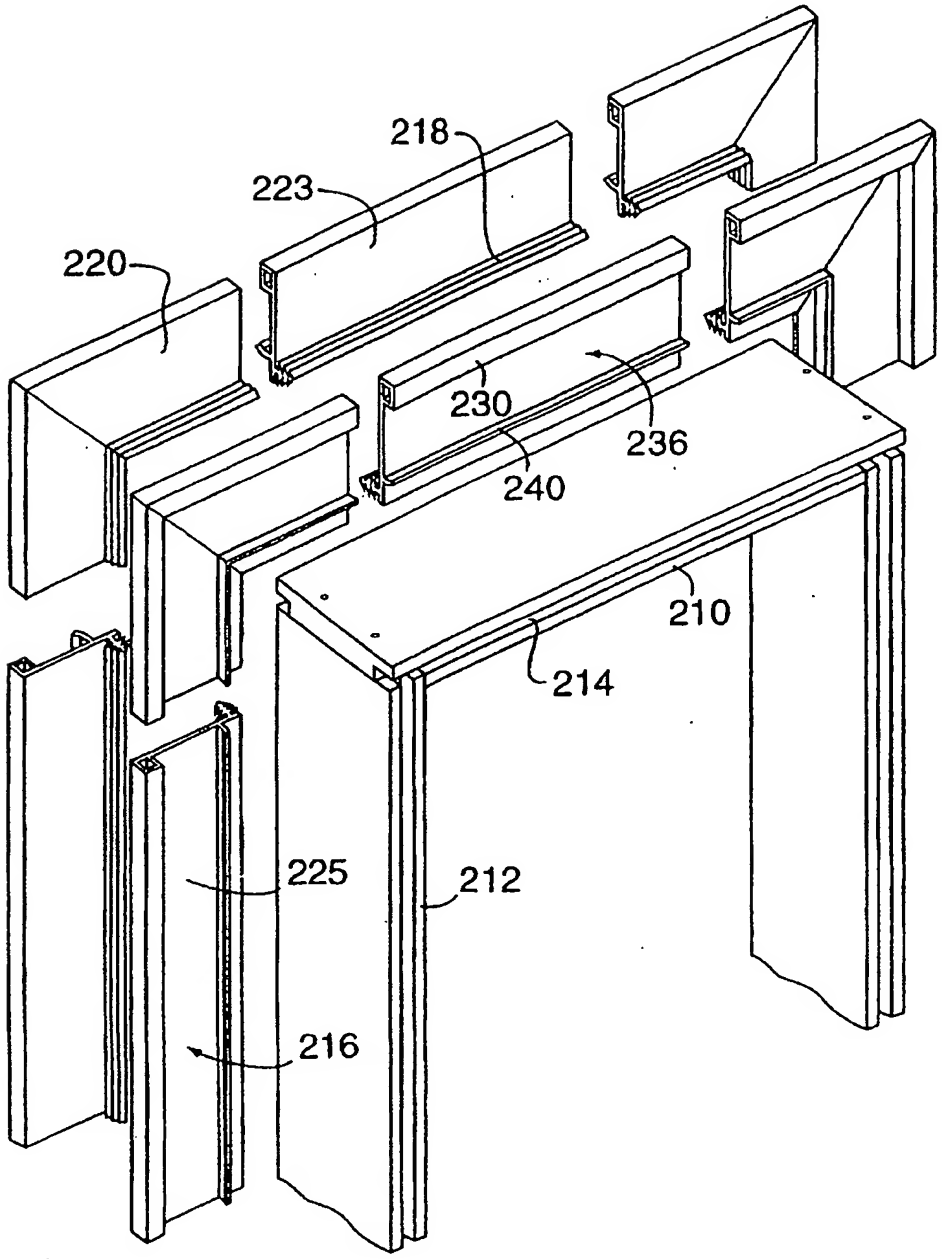

FIG. 7

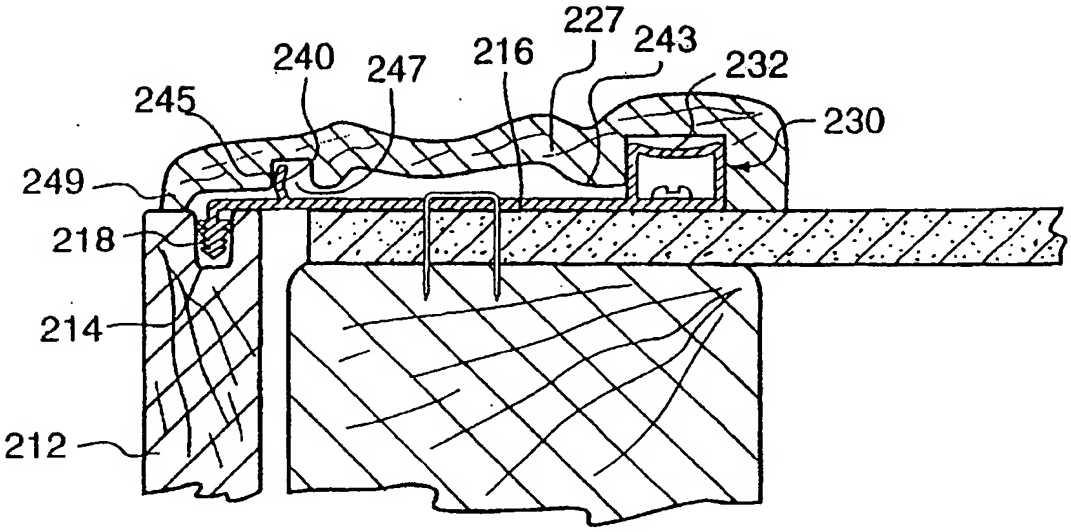

FIG. 8

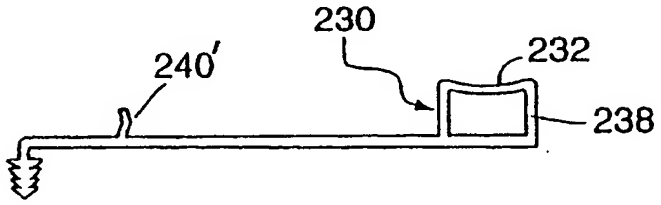

FIG. 9

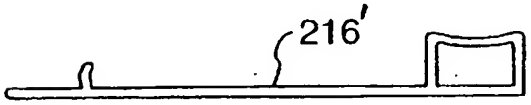

FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 96/00065

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E06B1/62 E06B1/08 E04F19/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 E04F E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP,A,0 377 780 (HOFSTETTER) 18 July 1990 see column 3, line 32 - column 7, line 38; figures ---	1,7,24, 25,27 21-23
Y A	WO,A,93 19273 (ASQUITH) 30 September 1993 cited in the application see claims 1-8,15,16,19,20,23; figures 1-3 ---	21-23 1,7,27
A	GB,A,2 239 281 (YOUNG) 26 June 1991 see page 5, line 8 - page 7, line 25; figure ---	1,7,14, 18,27
A	US,A,5 179 811 (WALKER) 19 January 1993 see column 4, line 62 - column 5, line 28; figures 4-6 --- -/--	1,3,7,27

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 October 1996	16 October 1996 (16.10.96)

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

In tional Application No
PCT/CA 96/00065

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,A,25 57 057 (BETTERMANN) 30 June 1977 see page 7, paragraph 7 - page 10, paragraph 2; figures	1,3,4,7, 8,10
A	FR,A,1 376 369 (PLASTOPRESS) 23 October 1964 see page 1, left-hand column, paragraph 6 - right-hand column, paragraph 2; figure 1	1,4,7-9
A	US,A,4 642 957 (EDWARDS) 17 February 1987	
A	WO,A,92 01847 (VILLA) 6 February 1992	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

In tional Application No
PCT/CA 96/00065

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-377780	18-07-90	DE-A-	3900907	26-07-90
WO-A-9319273	30-09-93	US-A-	5348066	20-09-94
		AU-A-	3762193	21-10-93
		CA-A-	2132741	30-09-93
		EP-A-	0656984	14-06-95
		GB-A,B	2279978	18-01-95
GB-A-2239281	26-06-91	NONE		
US-A-5179811	19-01-93	NONE		
DE-A-2557057	30-06-77	NONE		
FR-A-1376369	08-02-65	NONE		
US-A-4642957	17-02-87	NONE		
WO-A-9201847	06-02-92	AT-T-	134409	15-03-96
		AU-A-	8234491	18-02-92
		CA-A-	2087721	21-01-92
		DE-D-	69117294	28-03-96
		DE-T-	69117294	19-09-96
		EP-A-	0542785	26-05-93
		ES-T-	2086550	01-07-96
		US-A-	5459810	17-10-95